

Ecology for Teachers and Children

by Alan R. Berkowitz, Ph.D., Head of Education

- Teachers in SYEFEST ask: *Do decomposers have "taste" preferences?*
- Children in a class doing the Eco-Inquiry curriculum wonder: *Does compost 'tea' help radish plants grow?*
- High school students in a groundwater program consider: *In what direction is the water beneath our feet moving?*
- Second graders in an IES pond ecology program find out: *Which is warmer: pond water or the air above it?*
- Seventh graders along the Changing Forests EdVenture Trail investigate: *Where will recovery from field to mature forest be fastest?*

Questions, questions, questions ... Such questions lie at the heart of scientific inquiry, no matter if they come from elementary teachers, elementary or high school students, or practicing ecologists. We take in the world around us, notice nature's patterns, processes, or just plain intriguing events, and we try to make sense of it all by asking ... *Does? ... Which? ... Where? ... What? ... How? ...* and, ultimately, *Why?*

For nearly a decade, IES educators have been exploring ways to bolster people's inquiry abilities, in large part by testing strategies for helping people ask and then answer their own questions about the natural world. This common theme runs through IES initiatives in curriculum development and teacher training as well as in our work with local school-aged children. Each approach has its own unique strengths and presents its own challenges.

Let's take Eco-Inquiry, for example. This is a curriculum that was created, developed and piloted by Kass Hogan, IES research and development specialist, and published in June 1994 by Kendall/Hunt (*Eco-Inquiry: A Guide to Ecological Learning Experiences for the Upper Elementary/Middle Grades*). The curriculum is perhaps most noted for its integrated and sequential nature, a seamless choreography of experiences designed to help create within the entire classroom a community of inquiry. The depth and carefully constructed nature of each lesson are based on research in how children learn that shows just what it takes for the sorts of profound growth in thinking ability we are interested in fostering. Current work with Eco-

Inquiry focuses especially on teachers and teacher educators, and is seeking ways of using the curriculum to model the kind of teaching that fosters students' abilities to ask and answer questions.

Another Institute initiative is SYEFEST, or Schoolyard Ecology for Elementary School Teachers, which aims directly at teachers' concerns about how to use the real world for teaching ecology. They discover that they don't need to know all the answers, nor know what everything in their schoolyard is in order to facilitate their students' inquiries about nature. Since the National Science Foundation-supported IES project began, during the 1993-1994 schoolyear, approximately 4,000 students in 14 states have made meaningful observations and exciting discoveries in the places where they used to have only recess. Comments from the 161 teachers who have participated include "The students at one of my schools have had little exposure to in-depth science and it's been a journey to get them to think and wonder. It's now happening and they're making wider connections now", from Boston, Mass., and "They loved going out and 'researching'. Every day I would hear someone say, 'Can we go out and do some science research?'" from Millbrook, N.Y.

IES Education Program staff remains "grounded" in the realities of working with children in part through our on-site education programs. While we put primary

continued on following page



Groundwater Program: IES educator Ana Ruesink, 2nd from left, and high school students find groundwater at "Well 1" in the field behind the Gifford House.



Newsletter

Volume 12, Number 2
March - April 1995

Director's Note

One hundred and fifty years ago, our ancestors probably understood the natural world better than most Americans do today. This seems incredible in the "information age", with answers literally at our fingertips. But in 1850, most Americans lived on farms or in small towns where fields, streams and forests were close at hand. The science of ecology was as yet unborn, but its essence was for many a part of daily life.

A major thrust of our strong Education Program is to introduce students, teachers and the public to the natural world and to the science of ecology, which seeks to understand how the natural world functions. We do this through firsthand experience in the classroom and outdoors. An informed populace is essential to a healthy society, and our goal is to share our knowledge and the excitement of discovery with everyone we can reach. The cover story of this issue of the newsletter describes some of our education programs.

The IES Newsletter is published by the Institute of Ecosystem Studies, located at the Mary Flagler Cary Arboretum in Millbrook, New York. All newsletter correspondence should be addressed to the editor.

Gene E. Likens, Director
Joseph S. Warner, Administrator
Alan R. Berkowitz, Head of Education

Editor: Jill Cadwallader
Printing: Central Press

INSTITUTE OF ECOSYSTEM STUDIES
Education Program
Box R (Route 44A)
Millbrook, NY 12545-0178
(914) 677-5359

Teachers and Children, *continued*

emphasis on encouraging teachers to use readily available resources for teaching ecology (e.g., the schoolyard and nearby habitats), study in unique settings such as the forests, fields, ponds and streams here at the Institute is a useful supplement to school-based efforts. For us, it provides a chance to gain insights about what children are interested in, what kinds of questions they ask at different ages, and how to help them become more skilled at thinking through problems and designing experiments.

Children learn best if they are having fun in the process, and children have a great deal of fun in the Institute's pond ecology program. At Cary Pond, on one of the Arboretum's Cannoo Hills, elementary school students catch, observe and release frogs and aquatic invertebrates, discover where squishy pond sediment comes from and how creatures use it, and measure the pond's physical characteristics. They also add their findings to a long-term record of pond temperature. Older students do experiments in the Ecology Study Ponds at the IES Outdoor Science Center and, in this controlled setting, confront the pollution problems facing many local aquatic ecosystems. Even in these short programs, students raise questions and consider ways of getting answers.

In another on-site IES ecology education program that takes place along the recently completed "Changing Forests EdVenture Trail", small groups of students in grades 4 through 6 are challenged by trailside activities to discover how human and other disturbances (plowing, flood, windstorms, fire) influence the land. Meanwhile, by performing a series of tests at 'Puzzling Plots' along the trail, small teams of 7th to 10th graders learn about plant succession and how quickly forests recover after a disturbance. We achieve this ideal small group size by inviting several parents to join the group as facilitators, overseen by an IES educator. The idea of guiding students to do a battery of short studies with only a parent to supervise them is a challenging one. The students still are encouraged to learn research techniques and to draw their own conclusions.

The newest IES program to draw students from schools throughout the mid-Hudson Valley area is "Groundwater Ecology", which delves into the mysteries of underground water. During summer 1994, the final touches were put on the Institute's groundwater wells and small watershed demonstration area behind the Gifford House. High school and college students (as well as adult students in several IES



JILL CADWALLADER

IES Changing Forests EdVenture Trail: At one of the Challenge Stations along the trail, parents and students in a home school group receive their instructions from educator Elizabeth Hayes.

Continuing Education Programs classes) have learned about the depth, movement, vulnerability and importance of groundwater using this new interactive facility.

One thing we notice as we develop, expand and study our programs — and that spurs us to continue on in this direction — is the lack of experience many children have with the natural world. In fact, some tend to be more familiar with global issues, e.g., ozone holes and tropical rainforest defores-

tation, than they are with real organisms and environments that they see and subtly experience every day. They need help in focusing on what they actually observe and in learning to describe, quantify and restrain their conclusions to their concrete, real world experience. These learning behaviors build both a sense of closeness with nature and the thinking skills and habits of mind that make every day even more worth living.

Daughter's Day at IES

"Take Your Daughter To Work Day" was established in 1993 by The Ms. Foundation as a way to introduce girls to the variety of opportunities in today's workplace. On April 27, IES participated this year for the first time, with 19 girls sharing the morning with Institute staff. Girls from 6-8 learned about office computers, copiers and fax machines; took a nature walk; toured and transplanted in the greenhouse; and looked at 'critters' through a microscope. The 10-13 year-olds learned about the library computer system, did some laboratory work and explored the Weather Station, and the 14- and 15-year olds — already interested in careers in science — did more advanced laboratory and field observations. Daughters, right, and their Institute sponsors then shared their experiences over lunch in the Perennial Garden.



JILL CADWALLADER

Volunteer Profile: Angelika Denk



extracts the otoliths (earstones) for age and growth determination and analyzes stomach contents to learn what the fish had eaten. All this requires long hours seated at a microscope.

Enter Angelika Denk (left), who, for two-and-a-half months as an IES volunteer, helped Dr. Limburg with her microscope work and related projects. Ms. Denk, from Munich, Germany, graduated from the University of Regensburg last summer. At the university, emphasis was on studying "very fast" — Ms. Denk said that she was so busy learning she had no time to do anything, and what she wanted was to do something in ecology. She wrote to a number of research institutions around the world, offering to do volunteer work.

She spent the first two months of her ecological odyssey in New Zealand, working with the

Department of Conservation in the country's temperate rainforest to protect the native kokako. This pigeon-sized bird is a poor flier, and introduced mammals that prey on the birds and their eggs have brought it close to extinction.

From there, Ms. Denk traveled halfway around the world to the Institute, where she quickly became an important contributor to Hudson River research. At first she examined water samples from the river, sorting white perch and striped bass larvae for Dr. Limburg's analyses. These larvae, as well as other larval fish, prey on a type of zooplankton called *Bosmina*, and Ms. Denk's project evolved into the study of another type of zooplankton called *Leptodora*, which also feed on *Bosmina*. Ms. Denk has been counting and measuring the *Leptodora*, as well as doing a literature search on the microscopic animals, and now Dr. Limburg is developing a computer model to show whether or not they are indeed a significant predator on *Bosmina*.

Ms. Denk's volunteer work at the Institute ended in mid-April, which gave Dr. Limburg the opportunity to thank her publicly at the April 6 Volunteer Recognition Ceremony (see below). Back in Germany she will continue her studies to earn a master's degree, which, she says, is the only way to get a job in science there. After that two-year program, she hopes to apply again for volunteer programs around the world, to gain more hands-on experience before beginning a career in ecology or a related field.

Featured in the last issue of the IES NEWSLETTER was the research of Dr. Karin Limburg, a postdoctoral associate studying larval forms of white perch and striped bass from the Hudson River. As described, she first sorts the tiny fish, then

Volunteer Recognition Ceremony - 1995

The Institute of Ecosystem Studies is pleased and proud to have close to 90 volunteers working shoulder to shoulder with IES staff in the labs and library, in display gardens, at the greenhouse and at field sites, doing research, facilitating education programs and assisting with special projects in all areas. Each April — National Volunteer Month — these volunteers are honored at a dinner and awards program held at the Institute.

This year's Recognition Ceremony on April 6 drew 43 volunteers, their guests and their IES colleagues. It was the first to be held in the new auditorium, where, after a social hour and buffet dinner in the Plant Science Building, Director Dr. Gene E. Likens summarized the year's activities at the Institute and Dr. Steward Pickett, plant ecologist, gave a slide talk illustrating the ecological secrets of pollination. Awards were presented by Ms. Su Marcy, coordinator of the Institute's Volunteer Program, and the IES staff members with whom the volunteers worked.



From left: standing, Dr. Alan Berkowitz, Head of Education; Ms. Su Marcy, Volunteer Program Coordinator; and Mr. Charles Rivera (228 hours of volunteer work in the display gardens over the past year) ... and seated, Ms. Rose Marie Gillin (352 hours with the Education Program over the past year); and Ms. Ruth Melton, recipient of this year's 1000+ Award for her accumulated hours of volunteer work in the Greenhouse.

Calendar

CONTINUING EDUCATION

Summer semester offerings have expanded tremendously. Catalogues are available at the Gifford House. Classes and trips include:

Landscape Design

July 22: **Landscape Design for the Small Residential Site**
Aug. 19: **Lighting in the Landscape**

Gardening

July 15: **Field Course: The Lazy Gardener—Low Impact for You and Your Landscape**
July 15-16: **Insect Pests and Diseases of Plants**
July 22: **Daylilies: The Answer to Every Gardener's Prayer**
July 29: **Field Course: Summer Wild Plant Identification**
July 30: **Field Course: Pinching, Deadheading, Staking and More**
Aug. 5: **Basic Irrigation Systems**
Aug. 12 and 19: **Fundamentals of Gardening**

Natural Science Illustration

July 10-14: **Colored Pencil Techniques**
July 10-14: **Sketching in the Garden and Woodlands**
July 15 and/or 16: **Sketching at the Zoo**
Aug. 1-3: **Watercolors in the Garden - Extended**

Biology and Earth Science

July 23: **Field Course: Glacial Retreat—The Sediment Record and What Really Happened**
Aug. 5 and 6: **Field Course: Wetland Plant ID**
Aug. 12: **Field Course: The Amazing Diversity of Life in Soil**

Excursions

July 12: **A Tour of Stoncrop**
July 14: **Plants of Bartholomew's Cobble**
Aug. 19: **Wave Hill and the Cloisters**

Call 914/677-9643 for information.

For general information, call the IES Education Program Office at the Gifford House Visitor and Education Center: 914/677-5359 weekdays from 8:30 a.m. - 4:30 p.m.

SUNDAY ECOLOGY PROGRAMS

Free public programs are held on the first and third Sunday of each month, except over holiday weekends. Last-minute changes are sometimes unavoidable, so call 914/677-5359 to confirm the day's topic. In case of poor weather, call 677-5358 after 1 p.m. to learn the status of the day's program. The following programs begin at 2 p.m. at the Gifford House, except as otherwise noted*:

July 16: **Animals in a Grassland**, an outdoor activity for kids and their adults led by Catherine Corey and Ana Ruesink

Aug. 6: **Exploring Cary Pond**, an activity for kids and their adults led by Peggy Shea. Wear clothes and shoes you don't mind getting wet and a little dirty!

Aug. 20: **What's Happening in the Oldfields?**, a walk led by Dr. Steward Pickett (* meet at the Greenhouse parking lot, on Route 82)

• *We strongly recommend that participants in outdoor programs wear sturdy footwear and long pants tucked into socks.*

GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 4:00 p.m. daily except public holidays. Admission is by free permit (see below).

HOURS

Summer hours: **May 1 - September 30**
Closed on public holidays.

Public attractions are open Mon. - Sat., 9 a.m. - 6 p.m. & Sun. 1 - 6 p.m., with a free permit.

The IES Gift and Plant Shop is open Mon. - Sat., 11 a.m. - 5 p.m. & Sun. 1 - 5 p.m. (The shop is closed weekdays from 1 - 1:30 p.m.)

• *All visitors must pick up a free permit at the Gifford House Visitor and Education Center on Route 44A for access to IES public attractions. Permits are available until 5 p.m. daily.*

IES GIFT AND PLANT SHOP

New in the Shop... New York state maple syrup ... pocket guides to flowers, berries, trees, ferns, birds and animal tracks ... "eco-spouts" to convert your used plastic jugs into usable containers ... washable fabric lunch-bags ... and for children ... "SPROGZ", ceramic frogs with individual personalities ... bandana games

Senior Citizens Days: 10% off on Wednesdays

VOLUNTEER OPPORTUNITIES

The IES Volunteer Program is looking for enthusiastic women and men interested in working with Institute staff for a few hours (or more) each week at the Gifford House Visitor and Education Center. The summer wish list includes someone with photographic experience to do black-and-white photography for the newsletter; salespeople in the Gift and Plant Shop; gregarious individuals to orient visitors and/or assist with an ongoing visitor survey; and those whose organizational abilities help to make office work go more smoothly. For information on responsibilities and benefits, call Su Marcy, IES volunteer coordinator, at 914/677-5359.

MEMBERSHIP

Become a member of the Institute of Ecosystem Studies. Benefits include a member's rate for IES courses and excursions, a 10% discount on Gift Shop purchases, a free subscription to the IES Newsletter and participation in a reciprocal admissions program, with benefits at over 100 nature centers, forest preserves, gardens and conservatories in the U.S. and Canada. Individual membership is \$30; family membership is \$40. For information, call Ms. Janice Claiborne at 914/677-5343.

The Institute's Aldo Leopold Society: In addition to receiving the benefits listed above, members of The Aldo Leopold Society are invited guests at spring and fall IES science updates. Call Ms. Jan Mittan at 914/677-5343 for information.

**INSTITUTE OF
ECOSYSTEM STUDIES
Education Program
Box R
Millbrook, New York 12545-0178**



Newsletter

Volume 12, Number 2
March - April 1995

Nonprofit Org.
U.S. Postage
PAID
Millbrook, N.Y.
Permit No. 16



100% Recycled
Paper